

REMARKS

By this amendment, claims 1-8 have been cancelled, and claims 9-14 have been added. Thus, claims 9-14 are now active in the application. Reexamination and reconsideration of the application are respectfully requested.

The specification and abstract have been carefully reviewed and revised to make grammatical and idiomatic improvements in order to aid the Examiner in further consideration of the application. The amendments to the specification and abstract are incorporated in the attached substitute specification and abstract. No new matter has been added.

Attached hereto is a marked-up version of the changes made to the specification and Abstract by the current amendment. The attachment is captioned "Version with markings to show changes made."

On page 2 of the Office Action, claims 1-8 were rejected under 35 U.S.C. 112, second paragraph, as being indefinite. This rejection is believed moot in view of the cancellation of claims 1-8. Furthermore, new claims 9-14 have been carefully drafted to avoid the problems noted by the Examiner and to otherwise clearly comport with the requirements of 35 U.S.C. 112, second paragraph.

On page 3 of the Office Action, claims 1-8 were rejected under 35 U.S.C. 102(b) as being anticipated by Williams (U.S. 2,870,018); and claims 1-3, 5 and 6 were rejected under 35 U.S.C. 102(b) as being anticipated by Miyahara (U.S. 4,612,199). These rejections are believed moot in view of the cancellation of claims 1-8. Furthermore, these rejections are believed clearly inapplicable to the new claims 9-14, for the following reasons.

New claim 9 specifies a method of cooking food having animal protein as a main component, wherein the method involves, first, uniformly preheating the foodstuff, and then freezing the preheated foodstuff without a pre-cooling step being performed between the preheating and the freezing. The preheating is carried out uniformly by Joule heat so as to preheat an entirety of the foodstuff to a temperature of at least 50°C but less than 80°C. This

Joule heat-preheating is required by claim 9 to be carried out by forming a liquid electrolyte film on the foodstuff, and passing electric current through the foodstuff via the liquid electrolyte film so that the denaturing of protein occurs in the entirety of the foodstuff.

Thus, claim 9 now clearly recites a method of cooking food in which the entirety of a food is uniformly heated by Joule heat to a temperature of 50°C to 80°C, at which protein is completely denatured (i.e., denatured to the inside of the food), but at which the food is not yet edible (in the case of foodstuff which is usually eaten well done, such as chicken or pork). Due to the specifically-required preheating by Joule heat, the entirety of the food is heated simultaneously to the same temperature.

In contrast to the present invention of claim 9, the Williams patent teaches preheating of food, but the preheating taught by the Williams patent is not by Joule heat wherein a liquid electrolyte film is formed on the foodstuff and electric current passed through the food stuff via the liquid electrolyte film, as required by claim 9. Accordingly, although the Williams method utilizes high frequency heating to heat the food, such high-frequency heating does not provide the same beneficial uniformity of heating provided by the Joule heat according to the present invention. Also, the Williams patent discloses only heating to a temperature of 105°F (45.5°C), which is outside the claimed range of 50°C - 80°C. Furthermore, the Williams patent discloses only cooling to “just above freezing” (see column 4, lines 65-67), and thus does not disclose or suggest the freezing of the preheated food without a pre-cooling step being performed between the preheating and the freezing, as required by claim 9.

The Miyahara patent teaches the preheating of food using Joule heat. But, in the Miyahara patent, the food is immersed in salt solution until the salt solution sufficiently permeates into the food. The food is then taken out of the salt solution, and the electric current is passed therethrough. Accordingly, the Miyahara method is quite different than that of the present invention in which the foodstuff is uniformly preheated by Joule heat to a temperature of 50°C - 80°C by forming a liquid electrolyte film on the foodstuff and passing the electric current through the foodstuff via the electrolyte film so that the denaturing of protein occurs in the

entirety of the foodstuff. Also, the Miyahara patent does not disclose freezing after preheating, as required by claim 9.

Thus, for the above reasons, it is believed apparent that the present invention as recited in claim 9 is not anticipated by either of the Williams and the Miyahara patents. Furthermore, there is no teaching or suggestion in the references or in any of the prior art of record which would have cause a person having ordinary skill in the art to modify the Williams method or the Miyahara method or to make any combination of the references of record in such a manner as to result in or otherwise render obvious the present invention of claim 9. Therefore, it is respectfully submitted that claim 9, as well as claims 10-14 which depend therefrom, are clearly allowable over the prior art of record.

The Examiner's attention is also directed to the dependent claims which set forth additional features of the present invention and further define the invention over the prior art. For example, dependent claim 15 specifies that the freezing comprises freezing of the foodstuff to a temperature of 18°C or below. Claim 10 specifies that the preheating is carried out by transporting the foodstuff between a current-carrying portion (e.g., 2 in Fig. 2) of a heating device and an electrode portion (e.g., 3 in Fig. 2) of the heating device, feeding the liquid electrolyte (e.g., 4 in Fig. 2) onto the foodstuff to form a film of the liquid electrolyte on the foodstuff, and passing the electric current through the foodstuff via the current-carrying portion to an electrode portion 3 of the heating device. Claim 11 specifies that the transporting of the foodstuff comprises transporting the foodstuff on a conveyor 1. Claim 12 specifies that the feeding of the liquid electrolyte 4 comprises storing the liquid electrolyte 4 in a supply tank 5 located above the conveyor 1, and dropping the liquid electrolyte 4 onto the foodstuff as the foodstuff is transported by the conveyor 1. Claim 13 specifies that the dropping of the liquid electrolyte 4 onto the foodstuff comprises dropping the liquid electrolyte 4 through slits 7 formed in a lower part of the supply tank 5 such that the liquid electrolyte 4 flows along flexible brushes 6 that hang from the supply tank 5 and contact the foodstuff as the foodstuff is transported by the conveyor 1.

In view of the foregoing amendments and remarks, it is respectfully submitted that the present application is clearly in condition for allowance. An early notice thereof is earnestly solicited.

If, after reviewing this Amendment, the Examiner feels there are any issues remaining which must be resolved before the application can be passed to issue, it is respectfully requested that the Examiner contact the undersigned by telephone in order to resolve such issues.

Respectfully submitted,

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Version with Markings to
Show Changes Made

DESCRIPTION

Method of Cooking Food by Preheating
and Foodstuff to be Cooked by Heating

[Technical Field]

This invention relates to a method of cooking food by preheating and foodstuffs cooked by heating.

[Back-ground Art]

Among foodstuff containing protein such as meats, ~~fishes~~ fish, eggs and their processed products, some are refrigerated or chilled raw and distributed, and others are cooked by heating and then refrigerated or chilled and distributed.

The former foodstuffs, i.e. ones distributed raw can be stored without losing their flavor and taste, but it takes a long time to heat such foodstuffs to inside thereof when cooking at home or restaurants, etc. Also, since it is difficult to determine whether protein in the foodstuff has sufficiently denatured, the inner part may remain raw when grilled or boiled. Further, since they are stored raw i.e. without heating, in the case of e.g. meat or fish pieces on a stick such as "yakitori", that is, grilled chicken on a stick, if they are contaminated with germs such as colon bacilli during processing, many of them may remain alive.

Foodstuffs that are distributed after cooking by heating can be served quickly by preheating them in e.g. a microwave oven. But since the time elapsed after cooking is long, flavors and tastes are inferior compared with ones that have just been cooked.

[Disclosure of Invention]Summary of the Invention

An object of this invention is to improve a foodstuff to be cooked by heating, the main component of which is animal protein and which is to be refrigerated or chilled for storage so that it can be easily cooked in a short time while keeping flavors, tastes and hygiene.

According to this invention, there is provided a method of cooking food by preheating wherein a foodstuff for cooking by heating, the main component of which is animal protein and which is to be refrigerated or chilled, is preheated to a temperature range not less than the temperature at which protein is denatured and less than a cooking temperature before the foodstuff is refrigerated or chilled.

That is, by preheating a foodstuff of which the main component is animal protein to a temperature range not less than the temperature at which protein is denatured and less than the cooking temperature before being refrigerated or chilled, tastes and flavors are obtained as if the entire foodstuff was cooked to the inside only by heating at least its outside to a temperature not less than the cooking temperature. Also, it can be easily cooked in a short time with no variation. With this method, since the foodstuff is cooked from the state immediately before being edible, excellent flavor and taste are retained. Also, since the foodstuff is preheated to denature the protein before storage, even with a foodstuff in which contamination with germs is concerned, live germs dramatically decrease and scarcely remain due to the sterilizing effect by preheating.

As the preheating means, flame heating, vapor heating, hot air heating, microwave heating, and electric heating may be used.

If the preheating means is electric heating in which electric current is passed through the foodstuff to heat it with Joule heat, since the entire foodstuff is uniformly heated with Joule heat, protein can be

efficiently denatured to the inside of the food in a short time. As a method of electric heating, e.g. as described in JP patent publication 11-192060, a method may be used in which electric current is passed through a film of electrolyte formed around the food.

The temperature range for such preheating is not less than 30 °C and less than 135 °C, preferably not less than 50 °C and less than 80 °C.

If the foodstuff is to be refrigerated, by freezing it after preheating without going through pre-cooling, evaporation of water in the animal cells and ~~leak~~leakage of extracts are suppressed, so that the foodstuff is ~~storaged~~stored with cellular water and extracts in the foodstuff ~~retained~~kept rich. Thus, even after thawing and cooking, the foodstuff is rich in tasty gravy and juicy and full. Further, there is no fear of growth of live germs in the precooking step. This is hygienic.

The foodstuff to be cooked by heating of this invention, which is to be refrigerated or chilled for storage and of which the main component is animal protein, is preheated to a temperature not less than the temperature at which protein is denatured and less than the cooking temperature before being refrigerated or chilled.

As described above, in the method of cooking food by preheating according to this invention, before refrigerating or chilling, a foodstuff for cooking by heating whose main component is animal protein is preheated to a temperature not less than the protein denatured temperature and less than the cooking temperature to denature the protein to the inside so that when cooking by heating, tastes and flavors as if the foodstuff was cooked to the inside will be obtained simply by heating at least its outer portion to the cooking temperature or higher. Thus, it can be cooked in a short time with no variation. Tastes and flavors of the foodstuff are excellent. Also, since the foodstuff is preheated to denature the protein before storage,

even with a foodstuff in which contamination with germs is ~~concerned~~ a concern, due to the sterilizing effect by preheating, live germs dramatically decrease and scarcely remain.

As the means of preheating, by using electric heating in which current is passed through the foodstuff to heat it with Joule heat, the entire foodstuff is heated uniformly by Joule heat. Thus protein can be denatured efficiently to the inside in a short time.

If the foodstuff is to be refrigerated, by freezing it after preheating without going through pre-cooling, evaporation of water in the animal cells and ~~leak~~ leakage of extracts are suppressed, so that the foodstuff is ~~storaged~~ stored with cellular water and extracts in the foodstuff ~~retained~~ kept rich. Thus, even after thawing and cooking, the foodstuff is rich in tasty gravy and juicy and full. Further, there is no fear of growth of live germs in the precooling step. This is hygienic.

The food for cooking by preheating of this invention has as the main component animal protein and is adapted to be refrigerated or chilled. Since it is preheated to a temperature which is not less than the protein denatured temperature and less than the cooking temperature, anyone can easily cook it in a short time with no variation, and its flavors and tastes are excellent. Also, it can be distributed hygienically with live germs scarcely remaining.

[Brief Description of Drawings]

Fig. 1 is a diagram showing the steps of manufacturing grilled chicken to be refrigerated for storage according to the preheating cooking method of foodstuffs of this invention; and

Fig. 2 is a partially cutaway front view showing an electric heating device used in the preheating step of Fig. 1.

{Best Mode for Embodying Detailed Description of the Invention}

Below, with reference to the drawings, the embodiment of this invention is described. Fig. 1 shows the steps of preparing grilled chicken on a stick or "yakitori" to be refrigerated for storage for which the preheating cooking method for foodstuffs according to the present invention is employed. First in the material preparation step, chicken pieces as the material for yakitori are prepared. In the sticking step, a predetermined number of chicken pieces are put on each stick. In the preheating step, the chicken pieces on the sticks are heated to a temperature in the range of 50 °C to 80 °C so that the protein will be denatured to the inside until the red meat turns white. Immediately thereafter, they are fed to the refrigerating step and refrigerated to a temperature of -18 °C or under. The refrigerated "yakitori" is shipped to groceries, yakitori stands, etc.

Fig. 2 shows an electric heating device used in the preheating step. The electric heating device comprises a conveyor 1 for transporting yakitori A on sticks, and an upper current-carrying portion 2 and a lower electrode 3, which are arranged so as to sandwich the transporting surface of the conveyor 1. An electrolyte 4 such as salt water is dropped from the current-carrying portion 2 to form a film of electrolyte 4 on the surface of the yakitori A on the conveyor 1. Electric current is then passed through the film of electrolyte 4 by the current-carrying portion 2 and the electrode 3 to uniformly heat the entire yakitori A with Joule heat.

Flexible brushes 6 hang from slits 7 formed in the bottom of a supply tank 5 in which is stored the electrolyte 4 so as to flexibly touch the yakitori A being transported on the conveyor 1. The electrolyte 4 in the supply tank 5 flows down along the brushes 6, forming the film on the surface of the yakitori A. Also, a multiplicity of through-holes 8 are

formed in the electrode 3 so that any excess electrolyte 4 will be collected in a lower storage tank 9. The electrolyte 4 that has been collected in the storage tank 9 is returned to the supply tank 5 by a pump 10.

In the embodiment, the present invention is applied to grilled chicken to be refrigerated. But the method according to the present invention is applicable to any food for cooking by heating whose main component is animal protein and which is supposed to be refrigerated or chilled, such as meats other than chicken, ~~fishes~~fish, eggs and processed foods such as hamburg steak.

ABSTRACT

For a foodstuff of which the main component is protein and which is to be refrigerated or chilled for storage, it is desired to improve it so that it can be cooked easily in a short time and is superior in ~~flavors~~ flavor, ~~tastes~~ taste and hygiene. Before refrigerating grilled chicken on a stick as the foodstuff to be cooked by heating, it is preheated by passing electricity to heat it to a temperature not less than the temperature at which protein is denatured and less than the cooking temperature until its protein is uniformly denatured to the inside thereof ~~so that~~ Thus, simply by preheating at least its outside to a temperature not less than the cooking temperature during cooking by heating, ~~tastes~~ taste in which the entire grilled chicken is heated to the inside are obtainable and it can be cooked easily with no variation in a short time with excellent ~~flavors~~ flavor and ~~tastes~~ taste.